Jonathan S. Maltz, Ph.D.

Education

Ph.D. Electrical Engineering	University of California, Berkeley	1999
M.Sc. Eng. (Electrical)	University of the Witwatersrand, Johannesburg	1996
B.Sc. Eng. (Electrical)	University of the Witwatersrand, Johannesburg	1994

Current research interests

Algorithms and instrumentation for evaluation of cardiovascular function and metabolism.

- Reconstruction algorithms for dynamic emission computed tomography.

- Algorithms for robust estimation of the parameters of compartmental models of biological systems.

- Covariance shaping least squares estimation algorithms for fully 3D tomographic reconstruction that allow *a priori* image covariance specification.

- Instrumentation for routine, non-invasive evaluation of arterial function and the integrity of vascular endothelial response.

- Investigation of Alzheimer's Disease as a systemic vascular disorder.

Biomonitoring

Instrumentation and algorithms for wireless ambulatory biomonitoring:

- Design of wireless ambulatory biomonitoring systems utilizing MEMS sensors, Bluetooth and micropower radios.

- Design of bracelet wireless reflection photoplethysmograph to enable continuous pulse pressure waveform monitoring and analysis.

- Integrated design of hardware and software for robust detection of activity signatures that indicate that a monitored subject has fallen.

Positron emission tomography (PET) instrumentation

- Search for new high-speed, high-efficiency scintillators for PET using computational electronic modeling.

- Forumlation of calibration algorithms for depth-of-interaction PET camera for mammographic and small animal imaging.

Employment

Scientist   2001-present
Postdoctoral Fellow   1999-2001
Department of Nuclear Medicine and Functional Imaging
Lawrence Berkeley National Laboratory
University of California, Berkeley

- Developed of dynamic emission computed tomography (ECT) image reconstruction algorithms. These are robust computationally economical methods of reconstructing medical image sequences from inconsistent projection data. Developed the first algorithm able to fit full first-order compartmental model parameters directly from projections to thousands of pixels.

- Development and clinical evaluation of a new instrument for the routine evaluation of vascular endothelial function.

- Investigation of the possible origin of Alzheimer's disease as a systemic vascular disorder. This research involves the use of laser Doppler imaging to assess skin response to the iontophoresis of vasoactive compounds. These techniques are being evaluated for use in monitoring patient responsiveness to treatment with acetylcholinesterase inhibitors.

- Calibration algorithms for depth-of-interaction breast and small animal PET camera.

- Determination of optical properties of potential inorganic scintillators through computation of band-gap values.

- Design and implementation of wireless biomonitoring system.

- Development of techniques and instrumentation for the non-invasive determination of vascular sensitivity to graded ischemia.

Lecturer   2003-present
Departments of Bioengineering, and Electrical Engineering and Computer Sciences
University of California, Berkeley

- Image Processing and Reconstruction Tomography (BioE C165 / EE C145B)
  (Spring 2003)

Guest Lecturer   2002
Department of Bioengineering
University of California, Berkeley

- Intoduction to Bioengineering (BioE 153) Bioelectronics course module
  (Fall 2002)

Visiting Scientist   2002
Department of Physics
Uppsala University, Sweden

- Studied and implemented numerical methods for *ab initio* calculation of the band gaps of potential PET scintillation crystals.

Graduate Student Research Assistant   1996-1999
Department of Functional Imaging
Lawrence Berkeley National Laboratory

- Inconsistent projection dynamic emission computed tomography (thesis topic). Developed the first joint spatiotemporal reconstruction algorithm for multiple dynamic regions. Developed technique for parsimonious representation of tracer time activities within dynamic image sets.

Teaching Assistant,   1996-1999
Department of Electrical Engineering and Computer Sciences
University of California, Berkeley

- Image Processing and Reconstruction Tomography
  (Spring 1997-1999)
  Instructor: Prof. Thomas F. Budinger.

- Electronic Transducer Laboratory (Fall 1996)
  Instructor: Prof. Stephen E. Derenzo.

Publications

Refereed

Maltz JS, Eberling JL, Jagust WJ and Budinger TF. Enhanced cutaneous vascular response in AD subjects under donepezil therapy, *Neurobiology of Aging* 25:475-481 2004.

Huber JS, Choong WS, Wang J, Maltz JS, Pedrali-Noy M, Mandelli E, Derenzo SE and Moses WW. Development of the LBNL positron emission mammography camera, *IEEE Transactions on Nuclear Science* 50(5):1650-1653 2003.

Maltz JS. Parsimonious Exponential Spectral Analysis *Physics in Medicine and Biology*, 47(13):2341-65, 2002.

Maltz JS. Optimal time-activity basis selection for exponential spectral analysis: Application to the solution of large dynamic emission tomographic reconstruction problems, *IEEE Transactions on Nuclear Science*, 48(3):1452-1464, 2001.

Maltz JS. Direct recovery of regional tracer kinetics from temporally inconsistent dynamic ECT projections using dimension-reduced time-activity basis. *Physics in Medicine and Biology*, 45(11):3413-29, 2000.

Maltz JS. Region resolvability versus noise level characteristics for joint spatial and kinetic parameter estimation in inconsistent projection dynamic ECT. *IEEE Transactions on Nuclear Science*, 47(3):1143-8, 2000.

Gomes de Freitas JF, MacLeod IM and Maltz JS. Neural networks for pneumatic actuator fault detection. *Transactions of the SAIEE*, Vol. 90(1):28-34, 1999.

Maltz JS, De Mello Koch R and Willis AJ. Reproducing Hilbert space method for optimal interpolation of potential field data. *IEEE Transactions on Image Processing*, 7(12):1725-30, 1998.

Conference Papers

Maltz JS. Multiresolution constrained least-squares algorithm for direct estimation of time activity curves from dynamic ECT projection data. *Proceedings of the SPIE, Medical Imaging 2000: Image Processing*, 3979(24):586-98, 2000.

Gullberg GT, Budinger TF and Maltz JS. Dynamic Cardiac SPECT Imaging of Photon Tracers. *American Society of Nuclear Cardiology 5th Invitational Conference*, Bar Harbor, Maine, July 16-18, 2000.

Maltz JS, Reutter BW, Huesman RH and Budinger TF. Direct kinetic parameter estimation from dynamic ECT sinogram using dimension-reduced time-activity basis. *IEEE Nuclear Science Symposium and Medical Imaging Conference Record*, 3:1272-6, 1999.

Maltz JS, Polak E and Budinger TF. Multistart optimization algorithm for joint spatial and kinetic parameter estimation from dynamic ECT projection data. *IEEE Nuclear Science Symposium and Medical Imaging Conference Record*, 3:1567-73, 1998.

Abstracts

Maltz JS. Parsimonious exponential spectral analysis, *IEEE Nuclear Science Symposium and Medical Imaging Conference*, San Diego, California, November 4-10 2001.

Maltz JS, Budinger TF, Eberling JL and Jagust WJ. Endothelium-mediated cutaneous vasodilation response to acetylcholine is intact in Alzheimer's subjects under donepezil treatment, *Society for Neuroscience Annual Meeting*, San Diego, California, November 10-15 2001.

Maltz JS and Budinger TF. Rapid dynamic myocardial SPECT reconstruction from inconsistent projections via iterative least squares method. *Society for Nuclear Medicine Annual Meeting*, Toronto, Canada, June 23-27 2001.

Budinger TF and Maltz JS. Novel technique for non-invasive measurement of vascular reactivity. *American Heart Association Scientific Conference on Molecular, Cellular and Integrated Physiological Approaches to the Failing Heart*, Salt Lake City, Utah, August 18-22, 1999.

Maltz JS, Polak E and Budinger TF. Simultaneous estimation of spatial and kinetic parameters in single rotation dynamic myocardial SPECT. *Journal of Nuclear Medicine*, 40(5):77P, abstract 311,

2000.

Technical reports

Maltz JS. Towards practical algorithms for dynamic emission tomography. Ph.D. dissertation, University of California, Berkeley, May 1999.

Maltz JS. Hilbert space methods for aeromagnetic survey image processing, M.Sc. dissertation, University of the Witwatersrand, Johannesburg 1995.

Maltz JS. A low-cost respiratory flowmeter for artificially ventilated neonates, Department of Electrical Engineering, University of the Witwatersrand, Johannesburg 1994.